# Mains Remote Control: Encoder

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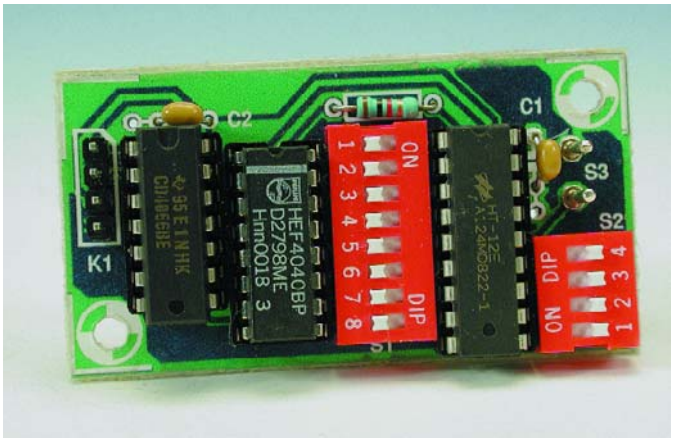
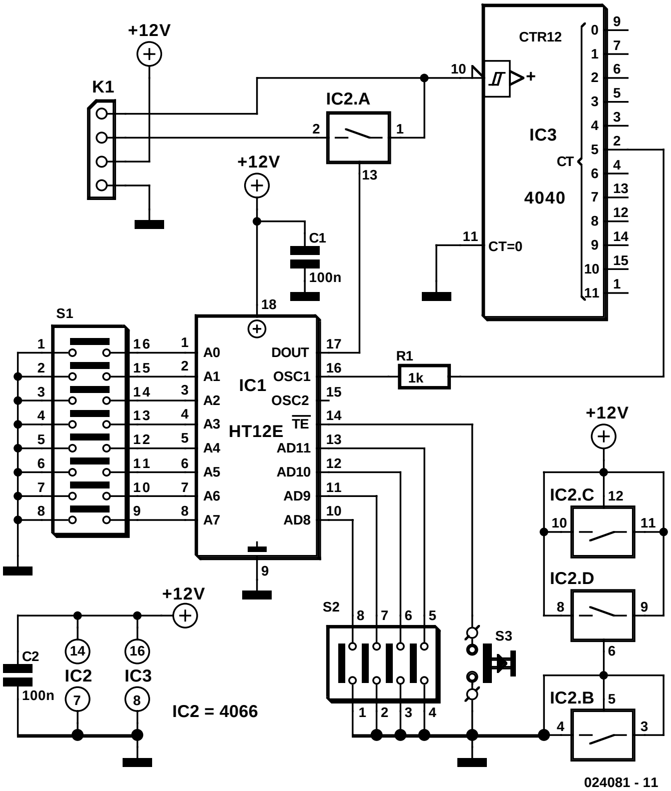
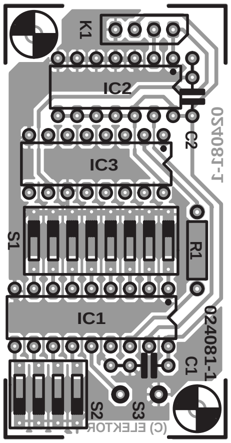
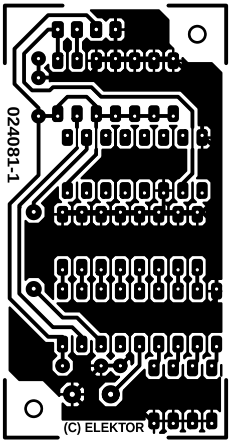




This application can actually be considered to be a slight adaptation of the standard use of the Holtek HT12E encoder (www.holtek.com). We have used this IC several times already, so it does not need any further explanation. The small circuit described here is intended to be used as an extension to the 'Mains Remote Transmitter', but it also clearly illustrates how the IC can be used in a non-standard manner.

The HT12E is normally used with its internal oscillator by connecting a resistance between the OSC1 and OSC2 pins. Here we instead use the carrier frequency of the transmitter. For this purpose, connector K1 of the transmitter is connected to K1 of the encoder. The 143-kHz signal generated by the oscillator in the transmitter is divided by 64 by the counter (IC3), producing an oscillator frequency of approximately 2.2 kHz for IC1. **Note:** for this application, coupling capacitor C5 in the





## COMPONENTS LIST

**Resistors:**
R1 = 1kΩ

**Capacitors:**
C1,C2 = 100nF

**Semiconductors:**
IC1 = HT12E Holtek (Farnell)
IC2 = 4066
IC3 = 4040

**Miscellaneous:**
K1 = 4-way SIL-header
S1 = 8- way DIP-switch
S2 = 4- way DIP-switch
S3 = pushbutton, 1 make contact

transmitter must be bypassed in order to ensure that IC3 receives a sine-wave signal centred at half the supply voltage as a clock signal. The Philips type 4040 used here has a Schmitt-trigger clock input, which allows the sine wave to be used as a source of ‘clean’ clock pulses.

The HT12E has an output that is not internally modulated (DOUT, pin 17). The carrier wave from the transmitter is modulated by using a type 4066 analogue switch to switch the carrier on and off. The nice thing about this is that the switching is synchronous, since the data output of the encoder is derived from the carrier wave. Instead of using an IR LED modulated at 36 kHz, here we modulate a 143-kHz signal and transmit the remote control signal via the mains network.

The encoder is enabled using S3. S1 and S2 determine the address of the transmitted code, with the setting of S2 serving as the transmitted data in the receiver if an HT12D decoder is used. R1 provides a certain amount of decoupling for the capacitor of the HT12E oscillator circuit. The remaining switches of the 4066 are not used. The maximum current consumption with S3 pressed is around 0.6 mA.

The illustrated circuit board layout is approximately the size and shape of a matchbox and guarantees problem-free construction of the encoder.

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